



November 3, 2014

# ***ROOT CAUSE ANALYSIS REPORT***

Downtown Underground Network Event on August 13, 2014



## **AGENDA**

1. Introductions & Overview
2. Root Cause Analysis Review
3. O'Neill Management Consultants Review
4. IPL Action Plan
5. Response to IURC Data Requests
6. Q&A



# ***INTRODUCTIONS***

- **Kelly Huntington**
  - President & CEO
- **Joe Bentley**
  - Senior Vice President, Customer Operations
- **Mike Holtsclaw**
  - Director, T&D Engineering
- **Jim Sadtler**
  - Director, Transmission Field Operations
- **Kelly Millhouse**
  - Director, Substations and AC Networks

# Root Cause Analysis Review



## ***IPL OPERATORS RESPONDED QUICKLY TO SAFELY RESOLVE EVENT WITHIN 15 MINUTES***

Time	Occurrence
1:25p	- Conflicting 911 calls reporting smoke and loud banging noise from underground structure and smoke from manholes at 100 S Meridian Street
1:31p	- 1 <sup>st</sup> IFD units on scene
1:33p	- IPL Team Leader Field Service on scene
1:40p	- IPL Transmission Operations Control Center operator opens Gardner Lane UG 651 feeder breaker - <b>Event ends</b>

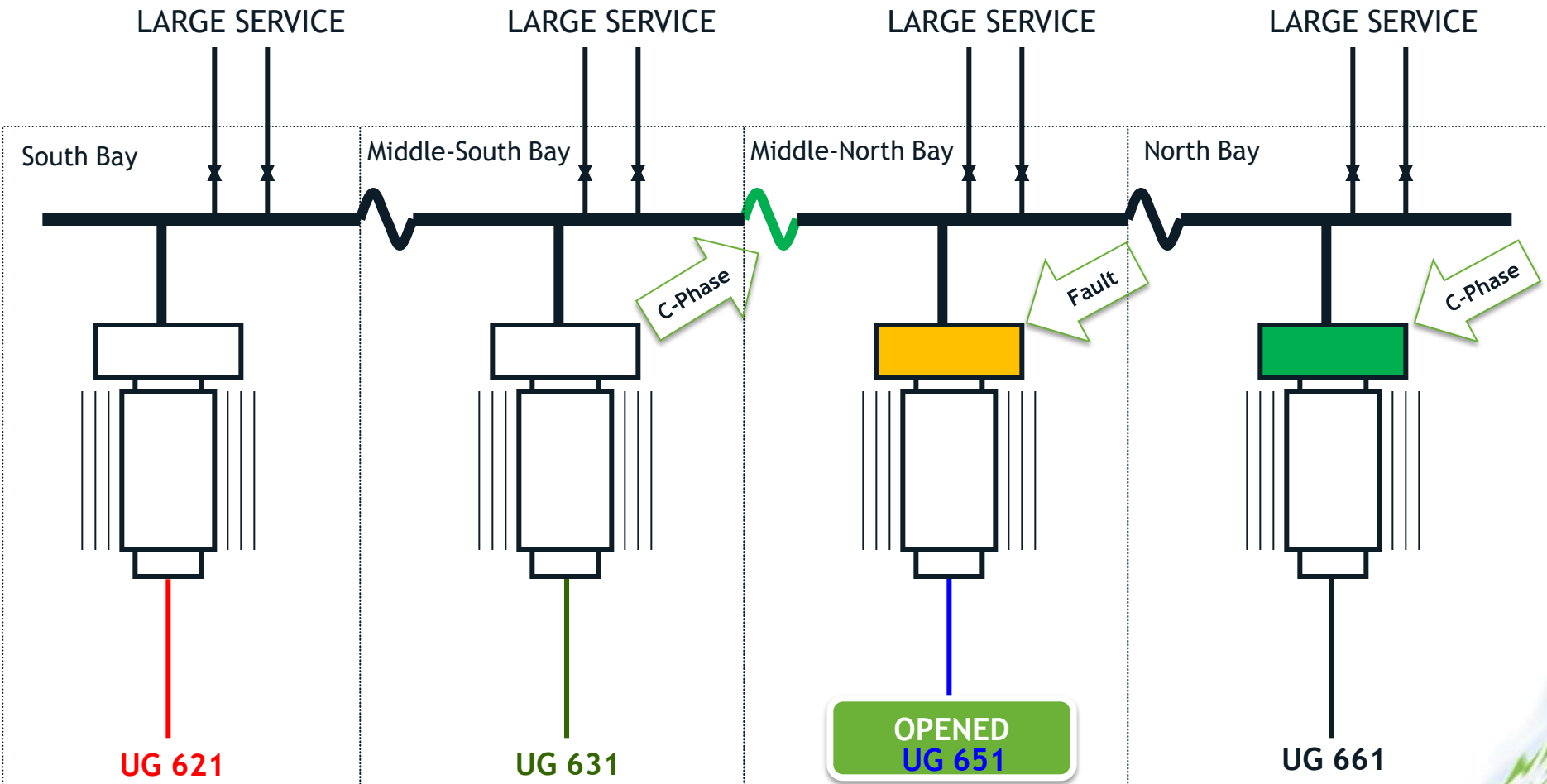


## ***IPL IMMEDIATELY CONDUCTED ITS INVESTIGATION AND INITIATED A ROOT CAUSE ANALYSIS PROCESS***

- Evidence preservation began immediately
- Assembled In-house team
- Contacted Eaton Corporation the next day
- Gathered Data
  - YouTube Videos & Security Video
  - IFD information
  - Maintenance & Inspection Records
  - Network Protector Information
  - PI Historian data (Network SCADA & ECS SCADA)
- Analyzed Data
- Developed Conclusions & Action Plans

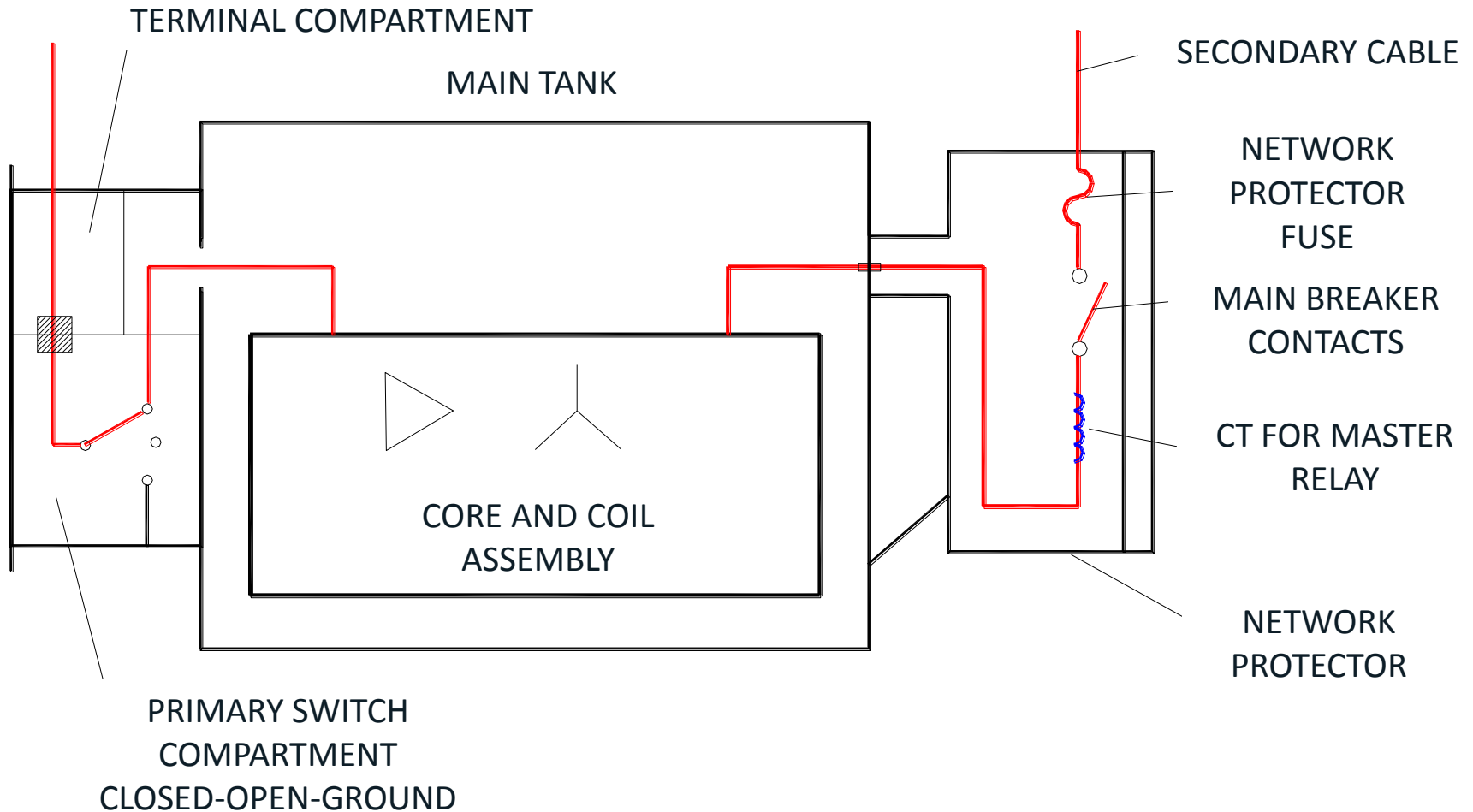


# 26 S MERIDIAN STREET 480-VOLT SPOT NETWORK VAULT





## ***IPL'S ROOT CAUSE ANALYSIS IDENTIFIED THE TWO POSSIBLE EVENT SCENARIOS***





## ***THE EVENT WAS COMPLETELY CONTAINED IN THE NETWORK PROTECTOR***

- The Network Protector door remained closed which reduced damage to other vault equipment



# O'Neill Management Consultants Review

# IPL Action Plan



## ***IPL HAS A THOROUGH PLAN TO OPTIMIZE DOWNTOWN NETWORK OPERATIONS***

	<b>Action Plan</b>	<b>Timing</b>
<b>1</b>	Replace all 480-Volt Network Protectors	12/31/2018
<b>2</b>	Document Network Event Response Plan	3/31/2015
<b>3</b>	Meet with Indianapolis Fire Department	9/10/2014
<b>4</b>	Develop Mitigation Strategy	3/31/2015
<b>5</b>	Conduct Review of Gateway Vault Communications	3/31/2015
<b>6</b>	Enhance Network Protector Inspection Process	11/1/2014
<b>7</b>	Update Succession Plans	June 1 <sup>st</sup> Annually
<b>8</b>	Conduct Staff Training	June 1 <sup>st</sup> Annually
<b>9</b>	Enhance Audit Maintenance & Inspection Records Process	3/31/2015



## ***IPL ACTION PLAN | #1***

- **Replace ALL 480-Volt Network Protectors**
  - Will replace all 480-Volt network protectors
    - 137 protectors in 44 vaults
  - Developed a five year program to replace approximately 30 per year
  - Estimated capital cost of \$15M
- **Verify the location of all 58 pre-1985 Westinghouse CM-22 network protectors - COMPLETE**
- **Re-prioritize the replacement program sequence COMPLETE**



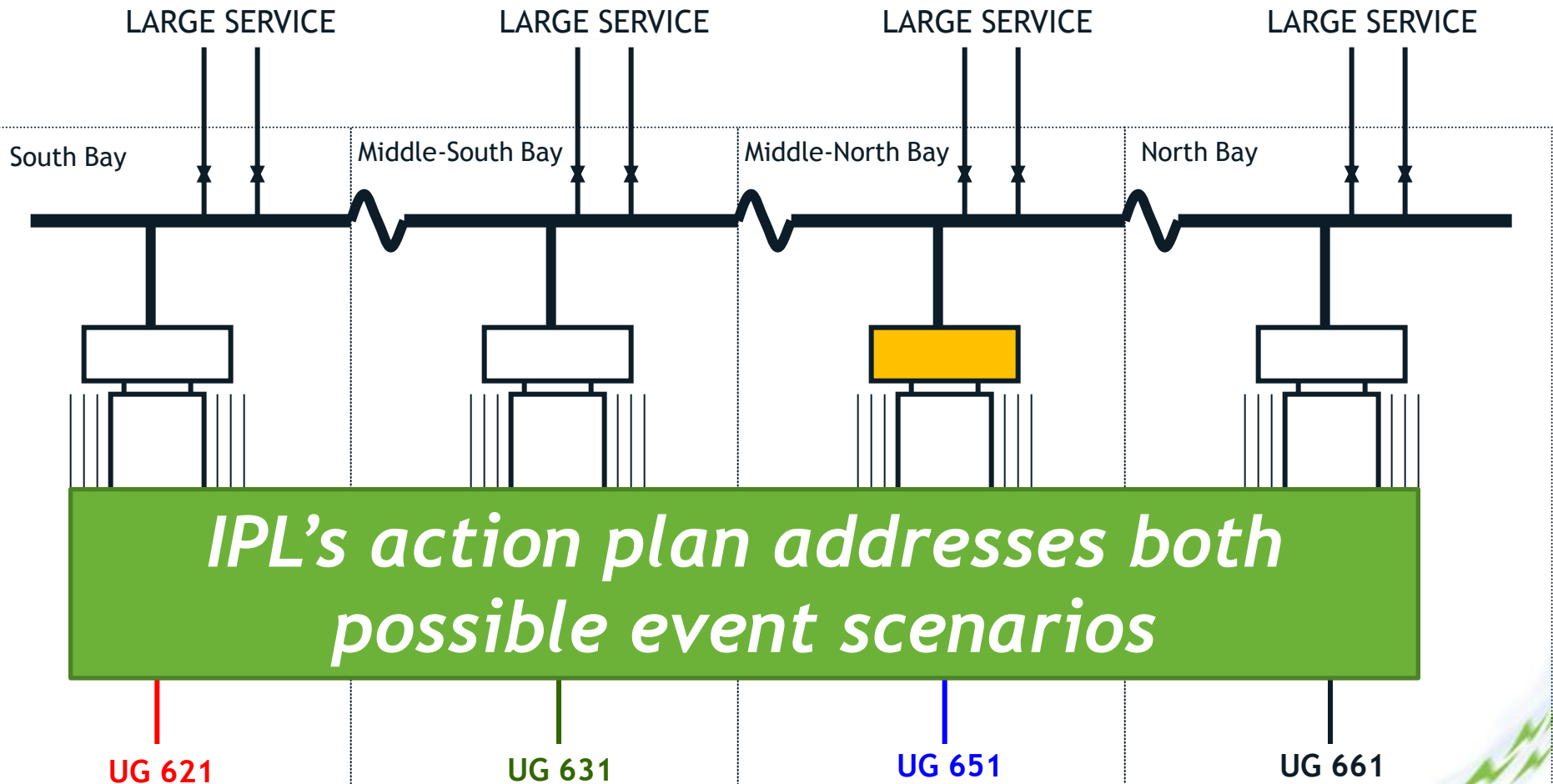
## ***IPL ACTION PLAN | #1 CONT.***

- Complete change outs by December 31, 2018
- Timetable allows for minimizing customer outages during the change-out and reduces reliability risks for the downtown network
- Responsible Party: Director, Transmission Field Operations



## IPL'S ROOT CAUSE ANALYSIS IDENTIFIED THE TWO POSSIBLE EVENT SCENARIOS

### 26 S Meridian Street 480-Volt Spot Network Vault





## ***IPL ACTION PLAN | #2***

- **Document a formal written Network Event Response and Test Plan including:**
  - Identification of key personnel
  - Event notification
  - Incident command structure for handling network events
  - Identification of on-scene IPL incident commander
  - Annual tabletop drill of the plan
- **Complete Plan by March 31, 2015**
- **Responsible Party: Director, T&D Engineering**





## ***IPL ACTION PLAN | #3***

- **Schedule meeting with the Indianapolis Fire Department - COMPLETE**
  - Review the response for a network event
  - Discuss coordination with IPL
  - Discuss lessons learned from August 13<sup>th</sup> event
  - Meeting was held on 9/10/14 and feedback will be incorporated in Network Event Response Plan (Recommendation #2)
- **Meeting was held on September 10, 2014**
- **Responsible Party: Director, T&D Engineering**



## ***IPL ACTION PLAN | #4***

- **Develop a mitigation strategy that limits severity and consequences of a network transformer or network protector failure**
  - Better information at the substation level
- **Complete Action Plan, including identification of major milestones for selected strategy by March 31, 2015**
- **Responsible Party: Director, Asset Management**



## ***IPL ACTION PLAN | #5***

- **Conduct a review of all Gateway Vault circuits for communications stability and frequency of telemetry errors**
  - Determine frequency of communication errors
  - Review response process for Network SCADA communication errors and who is notified
  - Review the routing of Blue Network SCADA communications cable in the vaults. Determine if there is a way to provide increased fire protection during an event.
- **Complete Review and Develop Action Plan, including major milestones by March 31, 2015**
- **Responsible Party: Director, Transmission Field Operations**

- Enhance the network protector inspection process
  - Add visual inspection of the bottom area around the transformer bus in the network protector for debris or evidence of tracking on the bus support insulators - Added to tablet electronic inspection form
  - Add visual inspection of the network protector bushing for signs of cracks or tracking - Added to tablet electronic inspection form
- Complete Changes to tablet software by November 1, 2014
- Responsible Party: Director, Asset Management





## ***IPL ACTION PLAN | #7***

- **Update Staffing Plans**
  - **Ensure no critical loss of institutional knowledge**
    - Continue to monitor, update, and implement the Company's succession plan for key staff responsible for network operations and emergency response
    - Includes control room staff, first responders, engineering support, and those responsible for public and customer communications
- **Complete by June 1<sup>st</sup> annually**
- **Responsible Party: Customer Operations Leadership**



## ***IPL ACTION PLAN | #8***

- **Staff Training**
  - Actively participate in industry forums and conferences where other companies that operate secondary network systems also participate
    - Example: 2015 Eaton Electrical Network Systems Conference
  - Annual funding for travel and memberships is included in O&M budget
- **Complete by June 1<sup>st</sup> annually**
- **Responsible Party: Customer Operations Leadership**



## ***IPL ACTION PLAN | #9***

- **Network Inspection Process Audit**
  - Implement process to verify inspection data from tablets is downloaded properly to on-line systems - **COMPLETE**
  - Implement periodic auditing of maintenance and inspection records for completeness
  - Conduct audit of back office process to improve and assure the retrieval and completeness of inspection and maintenance records in master database
- **Complete Process Audit and develop Action Plan to address any gaps identified by March 31, 2015**
- **Responsible Party: Director, Asset Management**

# Responses to IURC Data Requests





# ***IPL ENGAGES IN SUCCESSION PLANNING***

- **Long-Term Succession Planning**
  - Downtown Network is supported by an organization of 72 people and IPL regularly reviews scheduled work activities to optimize this number
  - The downtown network has an integrated web of leadership that is not dependent on any one individual
  - IPL's Power Delivery Staffing Study analyzes specific workforce and future needs to help support the succession plan process
  - IPL leverages this information to identify and develop individuals for all positions



# ***IPL IS COMMITTED TO MAINTAINING A SKILLED WORKFORCE***

- **Multi-faceted approach to succession planning**
  - Hiring the right people
  - Job rotations
  - On-the-job training
  - External formal training and conferences
  - System and Technical enhancements
  - Coaching and mentoring of young professionals



## ***IPL HAS STRENGTHENED THE RIGOR OF POWER DELIVERY ASSET MANAGEMENT***

- **Asset Management Framework**
  - Maintenance/Inspection and capital investment
  - Asset replacement programs for downtown network
  - Systematic approach using performance indicators
- **Power Delivery Organization integrated with DP&L as part of the new Customer Operations Organization**
  - Ensures continued high reliability provided in an efficient and effective manner
  - Provides additional people resources and increased opportunities to share best practices and knowledge



## ***IPL'S COMMITMENT***

- **IPL's downtown network system is safe and reliable**
- **IPL is committed to taking the necessary actions to assure the continued safe and reliable operation of its downtown network**
- **IPL continues to take actions to reduce the likelihood and impact of any future occurrences within its downtown network system**

# Questions



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# Appendix



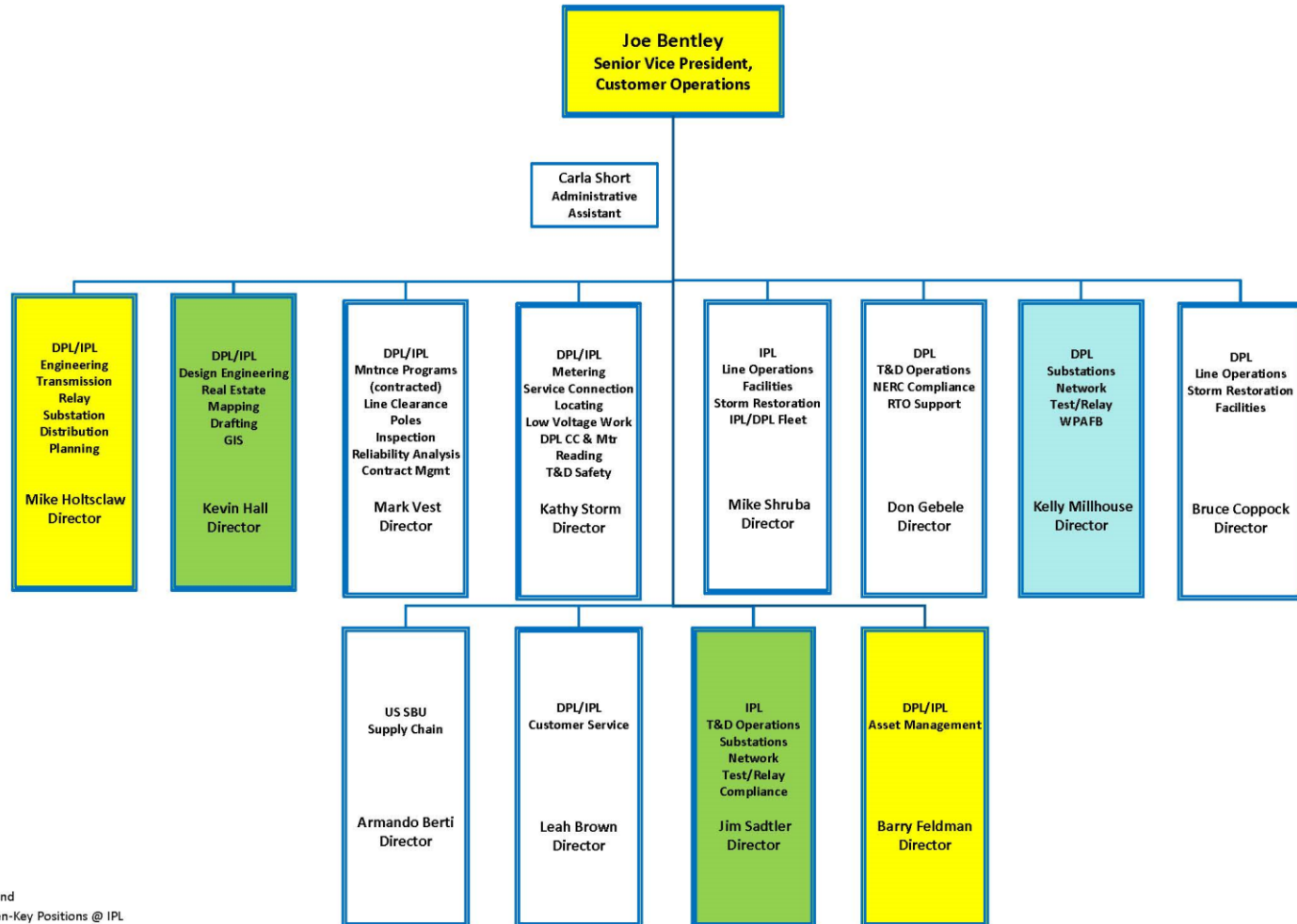
## **APPENDIX: POST EVENT UG 651 NETWORK PROTECTOR**





# APPENDIX: ORGANIZATIONAL CHARTS

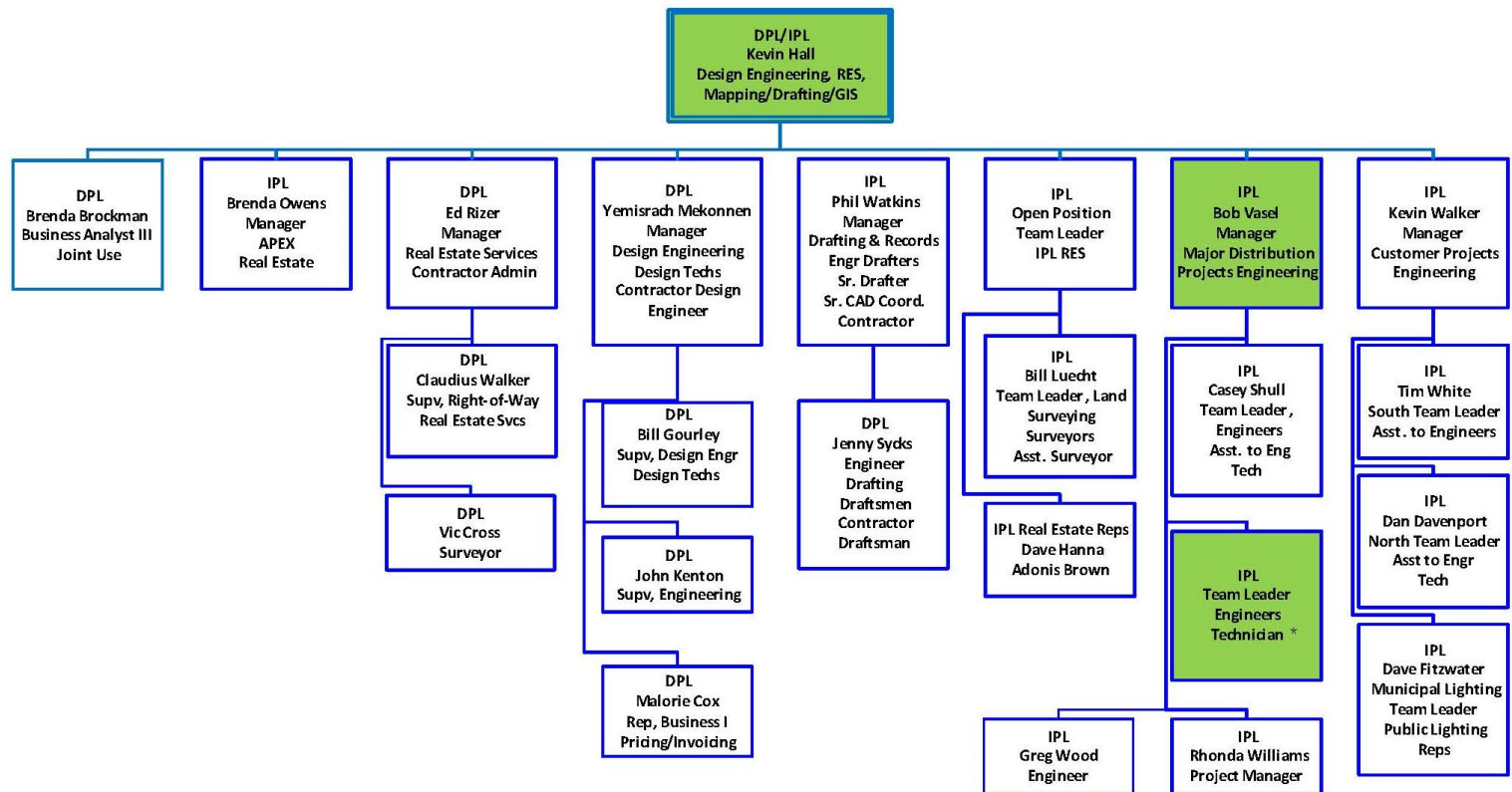
## Customer Operations Organization Attachment



Legend  
 Green-Key Positions @ IPL  
 Yellow-Backup Positions @ IPL  
 Blue-Mutual Assistance/Supplemental to Key Positions located @ DPL

# APPENDIX: ORGANIZATIONAL CHARTS

## Design Engineering Group Attachment



### Legend

Green-Key Positions @ IPL

Yellow-Backup Positions @ IPL

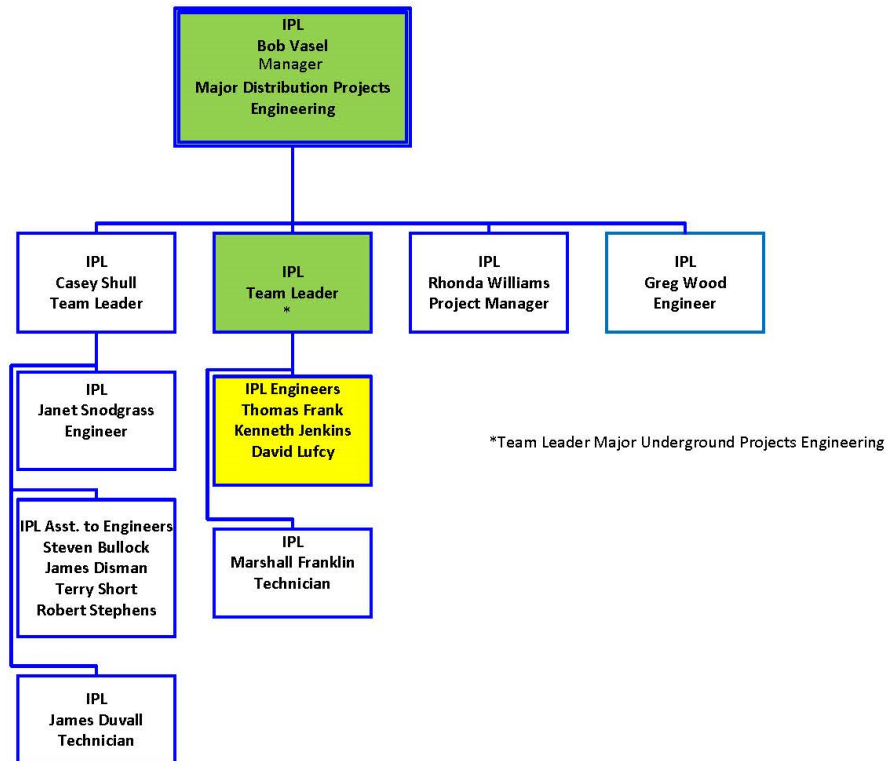
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\*Team Leader Major Underground Projects Engineering



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## IPL Major Underground Projects Engineering Group Attachment



### Legend

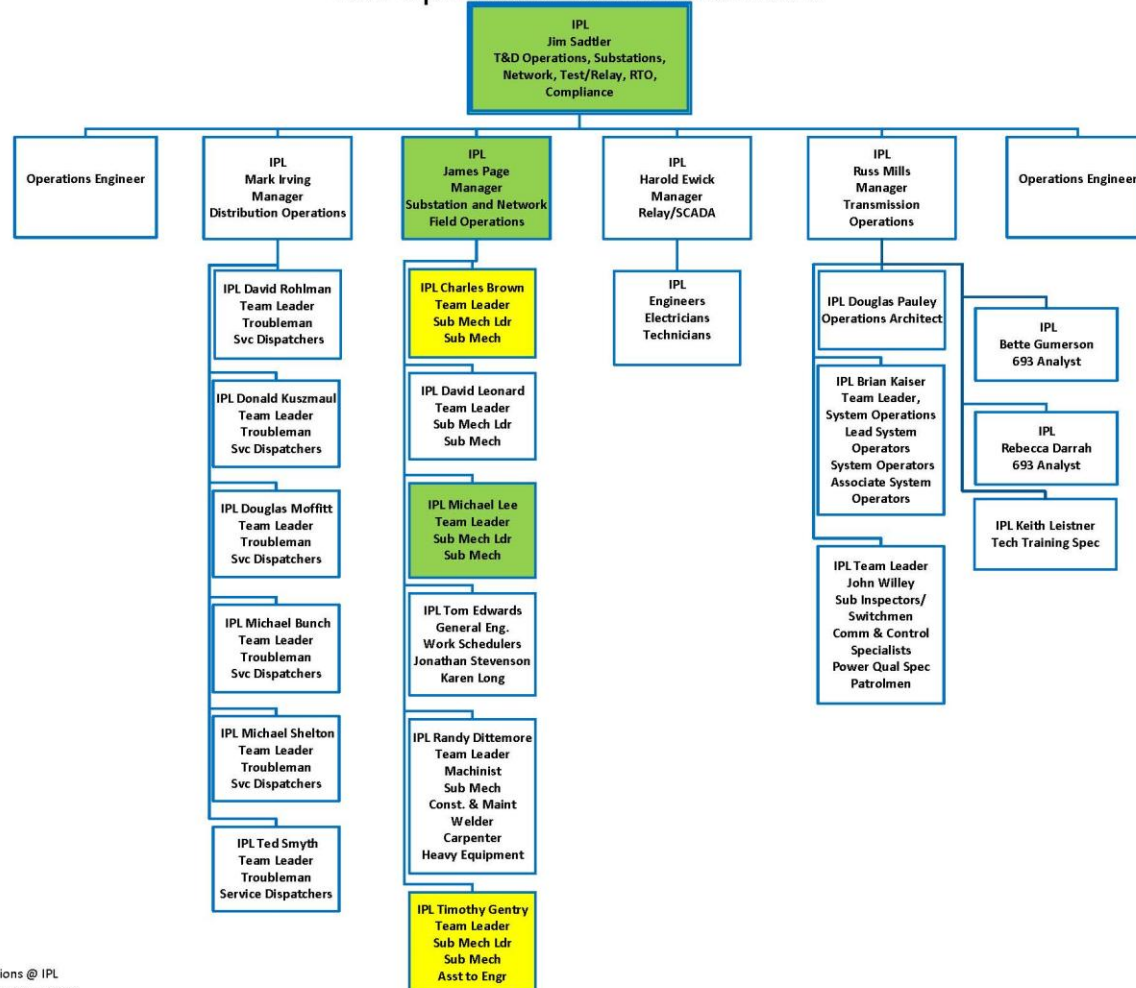
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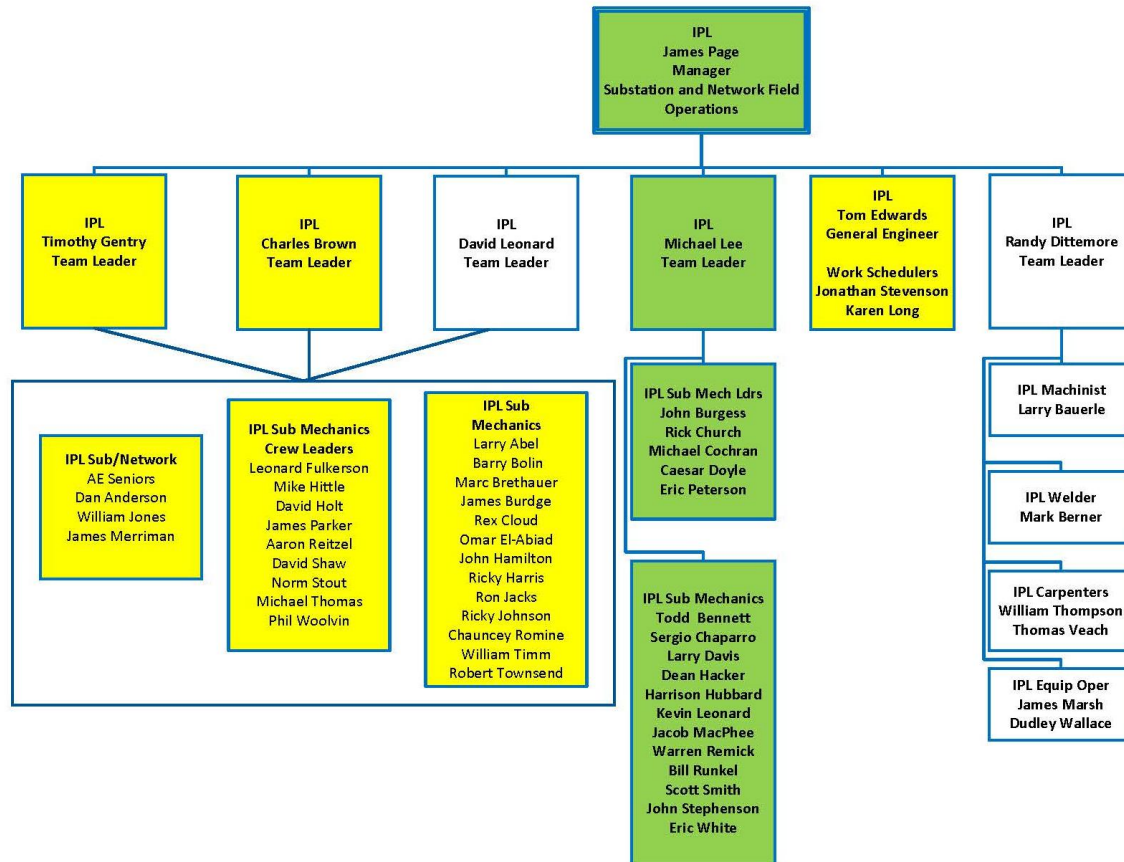
## T&D Operations Team Attachment



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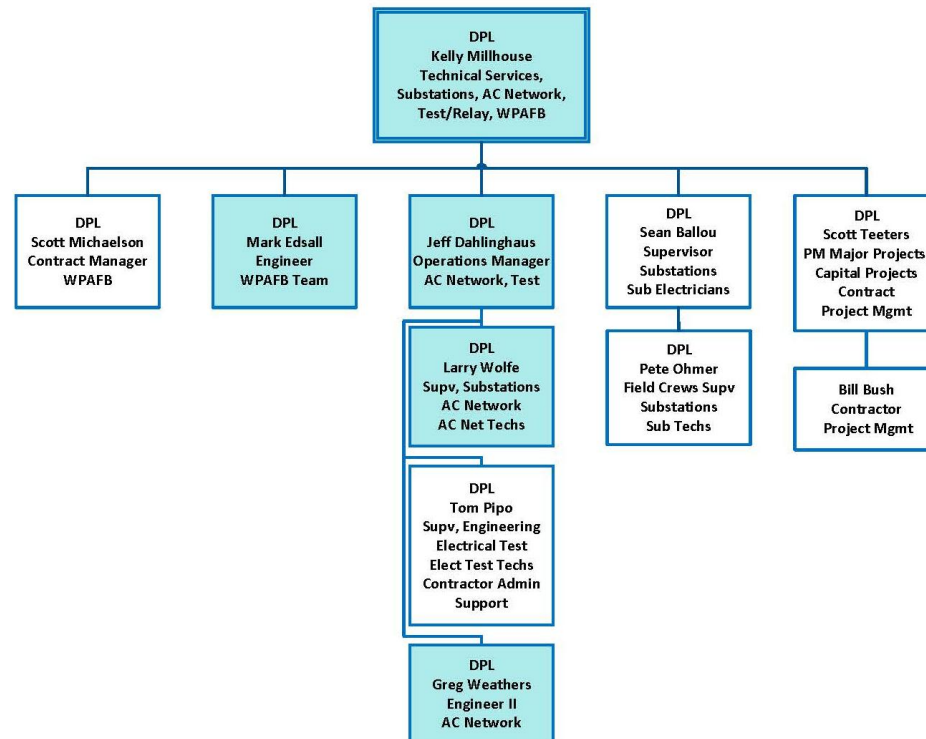
## IPL Substation and Network Field Operations Group Attachment



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## DPL Substations & AC Network Team Attachment



### Legend

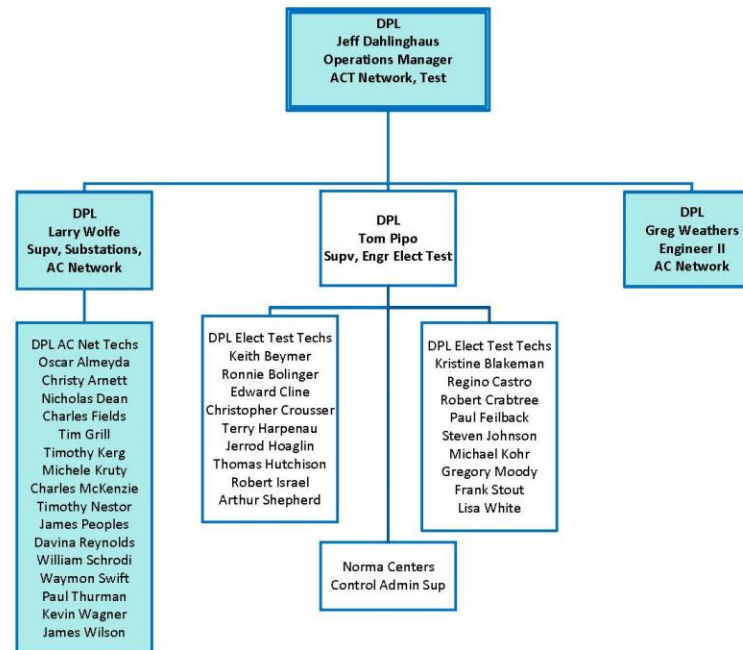
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# APPENDIX: ORGANIZATIONAL CHARTS

## DPL Substations and AC Network Team Attachment (Continued)



### Legend

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Yellow-Backup Positions @ IPL

Blue-Mutual Assistance/Supplemental to Key Positions located @ DPL